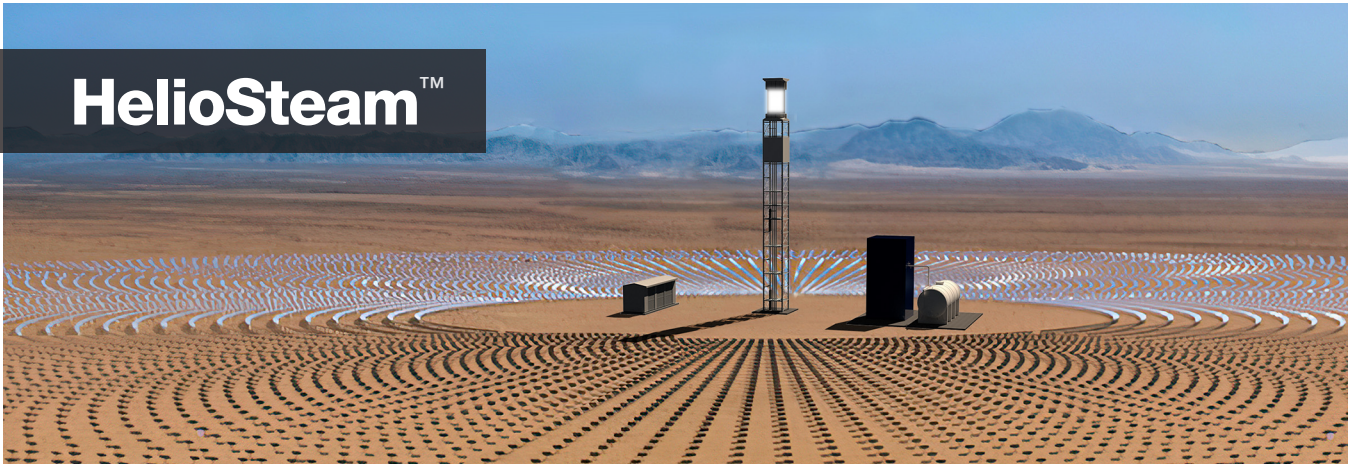


HelioSteam™



Heliogen channels the power of concentrated sunlight to create green steam from renewable energy sources and reduce your carbon footprint

Heliogen Creates Energy on Demand

Heliogen is a renewable energy technology company on a mission to decarbonize industry. Heliogen's AI-powered modular design uses concentrated sunlight and long-duration thermal energy storage to deliver around-the-clock carbon-free heat, steam, power, and green hydrogen.

Benefits

- Renewable industrial process heat
- Lower carbon emissions
- Dispatchable green steam
- High-efficiency processing
- Scalable system design
- Easy installation
- Automated maintenance

Industry Opportunities

- Mining & mineral processing
- Oil, gas & chemical
- Textiles
- Pulp & paper
- Food & beverage
- Manufacturing

Decarbonize Heavy Industry with Green Steam

With almost 80% of industrial primary energy coming from natural gas and petroleum¹, switching to renewable energy for steam processing is an important step to future-proof your business.

HelioSteam provides a robust solution for today's clean energy transition that meets challenging requirements for reliable high-temperature processes. The solution lowers fossil fuel dependency, helping customers achieve climate targets while mitigating high fuel prices to increase margins.

High Temperatures Created by Sunlight

Heliogen's solution derives from concentrated solar thermal energy, capable of reaching temperatures over 1,000 °C at the receiver. Fueling steam generation with thermal energy without an interim step delivers better efficiency and a simpler solution.

Thermal Energy Storage (TES) for Around-the-Clock Operations

Concentrated solar thermal energy unlocks the ability to store heat for off-sun operation. Our TES provides long term energy storage by storing thermal energy to be discharged over 10+ hours at night.

Computing Power Redefines What's Possible

Heliogen leverages ground-breaking artificial intelligence and computer vision technology to control small, factory-made heliostat mirrors. This design delivers higher temperatures and efficiency with simple components that are easier to install and maintain.

HelioSteam Product Quick Reference

System Details

Modular solution sized to match process requirements

- A 10 MW_{th} (1,000 Boiler hp) peak daytime steam output per module provides ~3 MW_{th} continuous steam delivery when coupled with thermal energy storage

Land-use scales with steam demand

- Nominal 27-acre (11 Hectare) footprint with 10 MW_{th} peak duty ~10,000 Heliostats (Exact land area and required number of Heliostats depends on solar resource and process requirements)

Fuel savings

- Peak 42 MMBtu/hr or continuous 13 MMBtu/hr fuel savings per module assuming 80% efficient gas boiler

Tower & Receiver Details

The modular solution includes a receiver and a tower where concentrated sunlight is captured during the day to generate steam. The green steam is then sent directly to the process or to a Thermal Energy Storage system where heat is stored to allow for dispatch of carbon-free steam around-the-clock.

Central tower

- 30-meter-tall central tower
- Tower is shipped in multiple pieces for fast assembly on site

Direct steam generating receiver

- 35 bar standard and 100 bar optional steam pressures generated using concentrated sunlight, delivered directly to the client or thermal energy storage
- Adjustable pressure letdown to match customer facility needs

Thermal Energy Storage (TES)

- Modular storage designed to fit site requirements and ensure optimal process integration
- Continuous steam delivery from TES of up to 20 bar

Heliostat Details

Built at our highly automated and centralized manufacturing facility, uniquely small heliostat mirrors are designed for mass production and easy installation. AI-controlled closed-loop tracking allows for improved accuracy.

Heliostat mirrors

- ~2 m² sized mirrors that are easily shipped and installed on site
- Minimal foundation for easy installation

Closed-loop AI-powered tracking and calibration

- Improved accuracy over traditional CSP solutions

Autonomous Cleaning Vehicle (ACV)

- Frequent cleaning for reflectivity optimization
- Night cleaning operations with no impact on steam production
- Reduced water consumption

Heliogen is currently implementing a steam configuration at a commercial site, which is expected to go live in 2023



Concentrating solar thermal energy facility in Lancaster, California. Since 2019, this facility has had working steam production and energy storage capabilities, as well as hydrogen production capabilities.

Heliogen

To learn more, contact us at:
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